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GEOGRAPHICAL INFLUENCES IN THE DEVELOPMENT OF NEW JERSEY*

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INTRODUCTORY NOTE.—New Jersey is very nearly a physiographic unit. Of its 480 miles of boundary, all but 48 miles are natural. The Atlantic is on the east; the Delaware River on the west; the Delaware Bay on the south. The river is wide enough and its valley is pronounced enough to form a genuine boundary, one that is to quite an extent a barrier. The northern part of the state is mountainous. The southern part is low, flat, and sandy. The relatively recent rising of the land has made a coast line destitute of deep harbors. The area of the state is 8,224 miles. Only three states are smaller. The average width of the state is not far from 50 miles. New Jersey is so nearly a natural geographical unit that its general outline has never changed.

ONE who studies the industrial development of Pennsylvania sees a single geographical influence which overshadows all others. It is the influence of her marvelous mineral wealth—five times as great in value of yearly output as that of her nearest rival.

One who studies the industrial development of New York sees again a single dominant geographical influence. He finds eight-tenths of her people and nine-tenths of her wealth in the row of counties touched by the Erie Canal and the lower Hudson. The influence of this water way, terminating in a splendid ocean harbor, has been the paramount geographical condition in the making of New York City and New York State.

One who studies the industrial development of New England sees the far-reaching influence of her waterfalls. Even as recently as 1870, seventy-two per cent. of New England's manufacturing was done by water power.

In each of these cases and many others the moulding influence in building up a state has been something within the state itself; its minerals, its

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physiography, its soil, or its water power. Not so with New Jersey. It has but limited mineral wealth. Three dollars per capita was the output in 1900, against twelve times as much in Pennsylvania. It has little water power, using only 150 water wheels in the entire state at the present time. Three-fifths of its soil is now yielding very little of commercial value. Two hundred and fifty miles of its coast has no commercial harbor and no commercial town with much more than local interests.

Yet, with all of these seeming handicaps, New Jersey stands among the foremost industrial states. Though it ranks forty-third in area among the states, it ranks sixth in manufacturing. In the per capita value of manufactures it ranks second only to Massachusetts; and in the percentage increase of manufacturing between 1890 and 1900 it led all, being nearly double that of its nearest rival, Illinois.

Strangely enough, this industrial development goes on with very little dependence upon the natural resources of the state. In this growth, one geographical influence overshadows all others and intensifies all others.

It can not be maintained that nature designed New Jersey for an agricultural state. With all its advantages of markets and transportation, one-half of the state is still covered with forest and underbrush. Nevertheless, in the value of farm crops per acre, New Jersey leads all of the states. Three-fifths of the state is coastal plain; low, sandy, half covered with pine and oak, thinly peopled, and without cities of any size except on the outer margins. This is South Jersey. Half of North Jersey is rough, thin soiled, and considerably forested. Yet, tracts of land on which the farmer could raise but little are selling for $1000 an acre, and swamps that, not long ago, perhaps could not have been sold for five dollars an acre, are now being eagerly bought at five thousand an acre. And the reason for this is the same one that explains the industrial development of the state generally; *the influence of geographical position.*

New Jersey presents some interesting and striking contrasts. You may live in Lakewood in the Pine Belt at one of the most sumptuous hotels in the world; mingle with the most fashionable society in America; in fact, be among the social refinements which belong only to the centers of wealth and cultivation. Yet, a few miles away you will find people almost as primitive as the mountaineers of the South; dwellers in cabins that know not carpets or paint, and whose adult occupants not infrequently go barefooted. Here in the Pine Belt of New Jersey, not far from the great city of New York, live the huckleberry pickers of the Pines; yet they are seemingly untouched by the influence of urban civilization.

Along the shallow bays that fringe the coast between Point Pleasant

and Atlantic City live another type of people, locally called the Baymen. This stretch of coast has as yet been but slightly invaded by the summer resorts. The bays are shallow and are visited only by fishing craft and small coasting vessels. On such a coast no trunk line terminates. No ships sail in and out to foreign ports. The shallow water and the hidden bars have left the fishing villages to work out alone their own peculiar type of men. And they are indeed the product of their environment. The wealth of the sea lies at their very doors. They know that there is no danger of hunger. They can go to the bay at any time and in a few hours capture clams or oysters for their own food and find a cash market for the surplus. The bay has never failed them and they have no fear that it ever will. Why should they take thought of the morrow? To-morrow will take care of itself as it always has done. Such a condition must make, and does make, men thriftless and improvident. It must and does encourage idleness, and make steady labor irksome.

The Baymen have their own pronunciation of English. A point of land is a *pint*. A marsh is a *mash*. A favorite expression is, "Well, I must git to gurn." *Gurn* is the substitute for going. The huckleberry pickers of the Pines and the Baymen of the Jersey shore are both natural responses to the particular surroundings amid which they live.

But conditions along a part of this coast are rapidly changing. The type of coast which has repelled over-sea commerce and has left the oysterman and clammer unmolested, is exerting its influence in quite a different direction. In and near New Jersey has grown up a dense and wealthy urban population, a class of people who seek summer homes and summer hotels within easy reach of the cities. Those very conditions which unfit the Jersey coast for commerce are the conditions which qualify it for summer homes and hotels. Along this coast for miles extends an almost unbroken line of palatial residences, clubhouses, and resort towns. Further south are the fishing villages, and then comes Atlantic City, the Queen of the Shore Resorts, the city of a thousand hotels. This notable expansion of sea-side resorts is due to two geographical influences: the type of coast and, more important still, the nearness of that coast to the great centers of wealth and population. To these resorts come visitors by the tens of thousands. Their demand for products fresh from the farm and dairy is one of the potent influences that stimulate farming in New Jersey and make it the Garden State.

So much for the geographical influence of the Jersey coast.

Now, as to manufacturing. The capital invested in manufacturing in this small state at the present time is far greater than was so invested

in the entire United States fifty years ago. That a state's manufacturing should be so great and at the same time so independent of its own production of raw materials, fuel supply, and water power, is noteworthy.

According to the federal census of 1900, the smelting and refining of copper was, in point of value of product, the greatest manufacturing industry in the state. This is practically all done in a single plant near New York Bay. The ore comes from nearly every copper producing region in the world, yet not an ounce of the ore or of the coal for smelting it comes from New Jersey.

Second in rank among the manufactures are iron and steel products. Yet only a small fraction of the iron ore used comes from the state.

Third in rank is the refining of petroleum, not one drop of which was produced in New Jersey.

Fourth in rank by the census grading, but really first in importance, is the manufacture of silk. This industry, centering in the city of Paterson, employs nearly 30,000 people, and represents an invested capital more than ten times as great as was invested in this industry in the entire United States in 1860. Yet every fibre of the raw silk was imported into the state.

Fifth, the manufacture of leather and leather goods. Then follows malt liquors, slaughtering and meat packing, and so on. It is not until we reach clay products and glass, respectively fourteenth and twenty-fourth in rank among the state's manufactures, that we find any close relation between the natural resources of New Jersey and her manufacturing industries. Why, then, are these plants located there? Let us see. Fully 70 per cent. of the capital invested is in plants located close to New York. Some are on the water front. All are close to the great coal-carrying railroads. It is evident that New Jersey is undergoing its remarkable industrial growth, not because of its own natural resources, but because of its unique situation between two great markets, two great ports, and within a short distance of coal.

New Jersey's situation has given her unequalled transportation facilities, both by rail and by water. At her water front on the lower Hudson nearly all of the eastern trunk lines and the ocean routes to all the world meet.

Here in Northern New Jersey is one of the clearest of examples of the influence of topography. Running north and south on the Jersey side of the Hudson is the Palisade ridge. About ten miles further west and nearly parallel to the Palisades, is another massive ridge of trap rock some three or four hundred feet high, very steep on the eastern side and

not cut by any low gap for a distance of about eighteen miles. No main lines of travel have found it practicable to cross the barrier within this distance. Westward from the Hudson the expanding population has pushed its way. Here are large areas of swamp locally called meadows. A generation ago they were worse than worthless. To-day they are being purchased, or already have been purchased, at fabulous prices, and are being filled in at enormous cost, to be used as sites for manufacturing and commercial establishments. Farm lands in this valley have passed into towns and towns have grown into cities and cities have grown together so that only a line separates them. The wave of urban population has rolled westward to the foot of First Mountain; it has pushed northward and southward along the valley and through the gaps at either end, but where it struck the steep face of First Mountain, there it stopped. This mountain cuts Essex County into two nearly equal parts, one-half lying toward New York, the other half toward the west. On the east is a swarming population, and all that goes to make up a metropolitan district. On the western side of the ridge the farmer tills his acres and cows roam over the pastures. In this half of Essex County live three per cent. of its people. In the other half live 97 per cent. And the barrier that divides the halves is less than 400 feet high. Yet east of it you are in the great metropolis of the lower Hudson. West of it you might readily believe yourself in a rural section of Ohio or Indiana.

In a narrow strip of land extending from the lower Hudson to the lower Delaware, and comprising one-sixth of the area of the state, live four-fifths of the people of New Jersey. In this limited area is concentrated nearly all of the manufacturing of the state. Outside of this narrow strip there is no important business city. There must, of course, be some geographical reason for this. Through the middle of this strip of land ran the ancient trail of the Lenni-Lenape; ran, a little later, the old Dutch road; ran, still later, The King's Highway from New York to Philadelphia, over which famous road the flying mail coaches carried passengers in the brief period of three days. Along this same course goes the Delaware and Raritan Canal, which may ere long be a link in our projected inshore waterway along the Atlantic Coast. And along this same narrow strip run the four tracks of the main line of the Pennsylvania Railroad. This route has been from the days of the Red Man a main artery of travel, for it furnishes an almost perfectly level path across the state. This route is, and is destined to be increasingly more, a link in America's chief highway of transportation.

The situation of New Jersey between New York and Philadelphia

makes it, among other things, a state of suburban homes. Not far from a quarter of a million people, as many as live in the entire state of Montana, daily pass from New Jersey to New York and Philadelphia to their regular business. The effect of this upon every phase of life in New Jersey is marked. The styles and standards of dress, the modes of life, the habits of thought, the business methods and standards of the great cities pervade much of New Jersey. The influence of the nearness of New York is just now being plainly seen in the advance of teachers' salaries in the Metropolitan District of New Jersey. New York City has established a schedule of teachers' salaries considerably higher than those paid elsewhere. Hundreds of the ambitious teachers in the Metropolitan District passed New York examinations. Many continued to live in the towns where they had formerly taught. Going daily to New York to their schools was possibly as easy as to live in one part of New York and teach in another. The result is that the cities of northern New Jersey are establishing salary schedules practically on a par with those of New York City. Nor is this influence confined to one class of salaries. The same effect is felt in all lines. This month trains begin running in two of the six tunnels under the Hudson. By these tunnels it will take less time to go from Jersey City or Newark to Lower New York than to go from Lower to Upper New York. It was not an idle dream of the artist when he drew a bird's eye view of New Jersey in the year 1950 and showed one continuous line of buildings, a city sixty miles long, reaching from the Hudson to the Delaware along the line of the Pennsylvania Railroad. Only those who live in that belt can realize the phenomenal changes that are going on.

Thus it is; whether we consider the state's development in agriculture, in transportation, in manufacturing, in the value of real estate, in the growth of sea-side resorts, in the range of prices or of salaries, we find the same dominant influence everywhere. The material growth of the state finds its stimulus not primarily in its own resources, ***but in its geographical position*** between two great states, two great cities, two great harbors, whereby it shares in the prosperity, the wealth, and the opportunities of both.

THE INDUSTRIES OF CLEVELAND, OHIO*

By W. M. GREGORY
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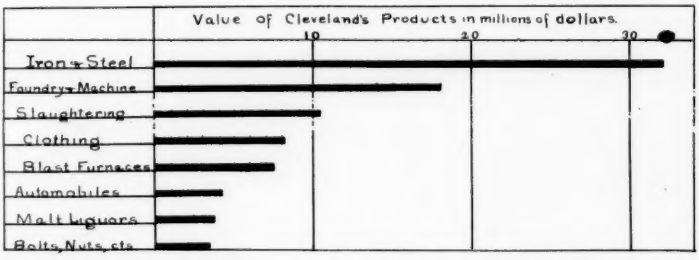
OHIO is advantageously situated for manufacturing because of its excellent facilities for easy and cheap transportation in the chain of lakes to the north, the great river to the south, the many canals and the network of railroads. It is easy to bring together the iron and coal, the two great raw materials of commerce, while the markets are convenient because of the central location of the state.

The rapid growth and development of Cleveland is a direct response to these natural advantages. It is not a surprise to us when we learn that



Cleveland's Important Products

Cleveland is the greatest inland shipper of coal on the lakes and a great receiving port for iron ore, and it is not only a great exchange port for raw materials but it is the greatest manufacturing city of the state. As might be expected, its chief output is iron and steel, which is nearly twice that of any other branch and about one-fourth in value of the total products of the city. Andrew Carnegie, who loves Pittsburg, has nevertheless said that for the manufacture of iron and steel, Cleveland was the ideal spot on the American continent. And, in justification of his words, Cleveland is to-day the greatest iron market in the world. Many smaller industries have developed because of this great supply of iron and steel, including eleven great plants for the erecting of steel bridges and buildings, while there are 134 foundries and various machine shops, making the total products from these various secondary iron working plants second in value to the iron and steel.

*Delivered before Institute for Teachers, Cleveland, Ohio

The manufacture of clothing, knit goods, etc., is the third industry of Cleveland; more than 148 establishments are devoted alone to men's and women's clothing. The total production of clothing is a little less than that of Cincinnati. The products of the slaughtering and packing houses are fourth in value, eight concerns consuming over 3000 animals each day and the eleven institutions devoted to sausage preparation indicates healthy competition.

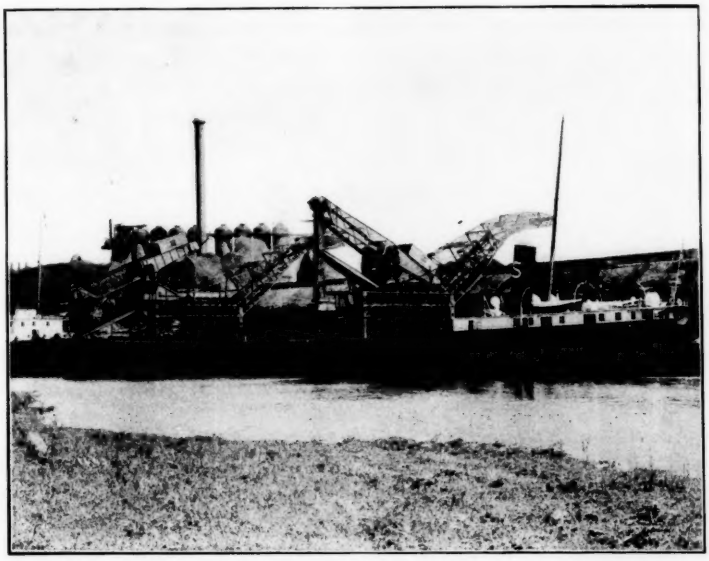
The products of the blast furnace constitute a distinct group of manufacturing and the value of pig iron is fifth in rank with the other industries. These furnaces run day and night, consuming thousands of tons of coke, limestone and ore.

The manufacture of automobiles is a new industry that has developed far beyond the dreams of its early originators. Cleveland is the second largest producer of automobiles in the United States and many of the machines made here in the seven various shops, have been gradually developed by the invention of home men. From the factories of this city, ten complete machines pass out each day and the total value is sixth in rank with the other industries. The malt liquor business is the seventh industry of the city and is only a small part of that of the state, while Cincinnati produces over one-half of the distilled liquor and one-third of the malt liquor of the whole state.

Cleveland is famous for many comparatively small but important industries; one of these is the production of metal working machines. In an iron city there is a great demand for steam hammers, lathes, slotters, punches, benders, etc., and this necessity has developed the manufacture of iron working machines. Many of the automobile factories of France and Germany are equipped with Cleveland built machinery. The finer mechanics of the city have turned out the delicate mountings for the great Lick and the Yerkes telescopes, as well as those for many of the smaller observatories in this country and abroad.

In direct contrast to the delicate instruments of precision required in the observatory are the great ship-unloading machines. These giants are built only in Cleveland shops and are sent to many parts of the world. One of the most modern of these machines is the Hulett 10-ton electric unloader. These machines are in operation at Conneaut, Lorain, Buffalo, and various other places, while a number are to be installed at Gary, Indiana. Each machine consists of two heavy parallel iron girders at right angles to the face of the dock and mounted on moving trucks. On the two girders a carriage travels back and forth, carrying a long pivot walking beam. On the front, or water end, of this walking beam is a vertical,

dependent leg, to which is attached the "grab" bucket. This leg always maintains a vertical position. The operator who controls the bucket rides in a cab on the lower end of the leg directly above the bucket. In operation the walking beam oscillates up and down, carrying the bucket down into the hold of the boat and up above the dock. The travel of the carriage back and forth on the heavy girders carries the walking beam and the



Hulett unloaders at work. Each "grab bucket" takes about 10 tons of ore. A cargo of 10,000 tons is unloaded in five hours.

bucket out over the boat and back over the dock. One of the machines will take 628 tons of ore out of the hold of a boat in one hour and place it in the stock piles. These machines are usually arranged so that several can work on the same boat at once and a cargo of 12,000 tons may be taken out in four or five hours. The boats are loaded with coal at the rate of a car a minute, the car being handled by a machine which is the product of Cleveland hands.

Cleveland is a great ship building port; some authorities give it a place second to Clyde. Last year one Cleveland company constructed 34 ships with a total tonnage of 191,602 tons. The better side of the vessel industry is that the majority of the modern boats engaged in the lake traffic are

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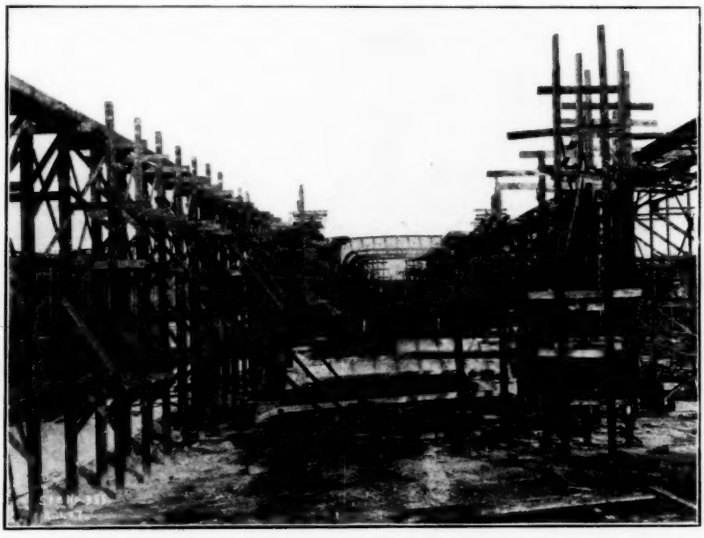
owned by Cleveland men. The old river bed of the Cuyahoga west of the present channel to the lake, is the site of great ship building plants. This is the cradle of the steel ore boats, where may be seen the 600-foot monsters in all stages of construction. On the long line of heavy blocks is laid the steel midrib, then the water-tight compartments constituting the bottom, are placed alongside. The sides of the boat are a row of heavy steel stanchions and the deck is made by connecting the top of these by steel girders. This is the great frame work which is covered outside and inside with steel



Steel ship construction. Putting the girders on the upright stanchions. Vessel is 12 days old.

plates. The modern boat when completed resembles a long flattened tube with many openings or hatches on the top. An old shipbuilder of Clyde once paid a visit to Cleveland and said: "I had thought that your ships would not compare with ours. You build them so quickly that I thought they would surely be inferior to those of Clyde, but they are the best in the world. I will say the best in the world, and you build them like magicians! You lay their keels to-day, to-morrow they are gone!" This is quite true for the boats are constructed in 60 to 90 days; the record is 53 days for a 10,000 ton vessel. The part that these boats play in the inland commerce may be seen in the record of the H. H. Rogers for 1907.

This boat carried in 27 cargoes over 324,000 tons, the largest single cargo was 13,333 tons and it holds the world's record for speed and cargo carried. The Leland S. DeGraff, a 600-foot steel boat recently carried to Buffalo 421,961 bushels of wheat, the largest consignment of wheat ever brought from the head of Lake Superior. These boats are increasing each year the amount of ore coming from the Superior region by nearly four millions of tons and during the past year over forty millions of tons of ore were moved, which is more than the total amount moved prior to 1888.

Among the smaller industries are several which supply indispensible articles for the housewife. Cleveland makes more vapor stoves and gas ranges than any other city of this country. It also stands first in the production of sewing machines. The city has the second largest cloak factory of the United States and is a great distributing point for millinery furbelows. The city contributes largely to the oil refining business of the country from its 80 refineries. Among their products are kerosene, gasoline, paraffine, dyes, disinfectants, lubricants, flavoring extracts, and soaps. For the home beautiful, paints and varnishes are made by the ton and carload each day in the 16 various factories, one of which is the largest paint producing establishment in the world.

The machinery, which enables the manufacturer of beet sugar to compete with the cheap cane sugar, is the work of Cleveland men who produce about one-half of the sugar beet machinery of the country, while for the South this city has made some of the largest cotton presses in the world. Ohio stands first among the states in the value of its annual production of carriages and wagons, while Cleveland ranks first in the manufacture of vehicle hardware. Carbon in its various forms has an important place in industrial work. Its use is extensive in storage batteries, all kinds of motors and dynamos, electric lights, and various paints and lubricants. Cleveland produces more than three-fourths of the electric light carbons of the country.

This brief summary of the industries of Cleveland shows us why it is quite frequently called the City of Varied Industries. If the skill and power for great interests are present, there are few disadvantages in this city for their development. The center of manufacturing for the United States is only a few miles southwest of the city and many of the eastern concerns have their largest plants here. Cleveland ranks ninth in the value of its annual factory products and its great natural advantage in location will give it continued growth in industry and population.

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PHYSICAL GEOGRAPHY IN SECONDARY SCHOOLS

By LOULIE C. KELLEY
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IT seems that the danger which threatens Physical Geography in the secondary schools is the tendency to make it unpractical; not to keep before the child the subject from the standpoint of life as well as that of science. Can we not remedy this evil? We teach the various forms of mountains, the forces which fashioned them, their structure; to be shown by diagram. Let examples of each form be given and located, those in our country to be taken first, then other examples. Let the pupil notice the trend of these mountains, the wind belts in which they are situated, the windward and leeward sides compared with regard to rainfall, vegetation, settlement, and occupations of the people.

Show how the history and progress of nations have been affected by these land forms. Mountains are barriers to the spread of life, but civilized man can overcome these barriers, as is illustrated in the case of the Simplon tunnel. Following this line of thought could we not talk of the effect that this tunnel has on trade?

We might next study volcanoes. After discussing the cause and the geographical changes wrought by the lava flows, let the students see that these are not things which could only happen ages ago, but are taking place to-day. For example we will not take the former eruptions of Vesuvius and neglect the recent outbursts, nor teach Krakatoa and neglect Mt. Pelee. In connection with the former eruption of Vesuvius we will talk of the excavations which have been made at Herculaneum and Pompeii.

In teaching volcanic islands we do not wish to teach Hawaii or the Madeira, with their location and effect on life, and neglect the phenomena attending the birth of Perry Island in the North Pacific as reported by the captain of the Albatross, and the later exploration by the crew of the Perry, for which the island was named. No matter which example we use we should show that the formation and isolation affects the life of these islands. If a teacher finds that the text-book which she uses is not abreast of the times, it is for her to correct this and supply the geographical changes just as far as possible.

The study of glaciers is a very important as well as a most interesting subject. We take glaciers formed among lofty mountains, or the great "Ice Sheet" which spread over part of our continent and Europe. The formation of these is studied, then the movement with the causes of the

movement. By using the block of ice for a simple experiment, show that pressure produces melting. If we have outline maps it makes the work very interesting to trace the limit of the "ice sheet," to mark some of the terminal moraines, the geographical changes wrought in different sections, and the effect on the lives of the people in each section.

After the work on rivers and glaciers has been completed I have found it very interesting to have the pupils write papers, comparing the work and the deposit of rivers with the work and deposit of glaciers.

When teaching "shore lines" we wish to see the *former* condition of such shores, which is shown by diagram, then the *present,* according to the strength of the forces and the length of time the forces have been at work. Study the "shore line" of parts of the United States and see what changes these forces have made and the effect on the commerce of the "shelving" shore line as compared with the depressed or glaciated shore. Take New Jersey and Maine as examples, looking to the future of such shores.

Along Norwegian or similar shores let the pupil read the map for the shore line and the surface of the country. Make cross sections of the same; then show the effect of such shores on settlement, travel, occupations, and character of the people. This is impressed by referring to books which they have read of the Vikings, or other people, living on similar shores. Along some shores an uplift has taken place which has caused the forces to work at a new level, therefore the settlement and occupations are changed as a result of this uplift.

Although Commercial Geography is taught as a separate branch, should we discuss physical features without showing the effect on the development of the nation? Take for example the drowned valleys and a productive interior resulting in the location of certain ports which are the receiving and distributing points; the *cause* of the "drift" plain in the United States with its rainfall and crops; the connection with the sea, the cities, which are the result of displaced rivers, to manufacture these products. Again, we can compare the growth of the cities in the Appalachian Highlands as compared with the cities of the Cordilleran system, the cities of the *eastern* coast as compared with those of the *western* coast. The pupil *should* review the reasons for the difference in products shipped by these cities.

When a child reaches the secondary school he should be able to locate the principal rivers and cities of the world, the mountain systems with their trend, the position of the continents on the globe and with regard to each other, and to make rapid sketches of the continents.

When teaching the characteristics of the different ages of streams, classify the principal rivers of the world according to age. We will take

the falls, rapids, and lakes of one as compared with the lowered divide, deltas, flood-plains, and ox-bow lakes of the other, with the change in velocity and deposit. Compare the African rivers with the rivers of the United States with regard to the development of the country. Let the pupil find all the *uses* which man has made of streams, such as water power, electricity, commerce, exploration, as compared with the disadvantages which he has suffered from them. In this way we show how the advantages overbalance the disadvantages.

We could not leave this subject without discussing the work which Great Britain has been doing to control the overflow of the Nile. Just here I should review the wind belts, letting the child understand the reason for the overflow in the summer instead of happening at another season.

At the same time we should tell them of the proposed "Deep-water" route from the Great Lakes to the Gulf, thereby opening up the great interior of our country. What effect will the building of the Panama Canal have on the cotton industry of the South?

While studying the *former* drainage of the Great Lakes as compared with the *present,* we will take up the *future* drainage should the Canadian uplift continue. What effect will this have on our country?

By diagram and modeling the child has shown the arrangement of the rocks under Niagara so he is at once interested in the recession of Niagara. Compare the recession on the Canadian as compared with that of the American side, which is, according to Gilbert, about five feet on the Canadian, while on the American the recession is only about three inches per annum.

If the child sees the cause of the gorge, the whirlpool, and other wonders of Niagara, he will see something deeper than just a flow of water should he ever visit them. He should know the uses and the danger which threatens this great wonder of America. Let the child observe from the tiny stream in the street *why* it deposits its detritus, then we can give laws regulating the deposit and the alluvial fans, deltas, and flood-plains of the world and the great populations supported thereon.

The recent report on the value of the eucalyptus tree for rapid growth and maturity helps us to understand the importance of preserving our forests and the effect on the distribution of rainfall.

One event which has engaged our attention for some time is the famous Salton Sink. This causes us to impress the great work of the Colorado River with the formation of the Sink. Then the use which was made of the Sink until the work of the Reclamation Service caused its present condition.

Why should it be necessary to irrigate in this section? We have kept abreast of the times by reading of the damage wrought, the changes caused, and the length of time required for evaporation before we have the *Sink* again instead of the *Sea.*

What is man doing to prevent the encroachment of sand dunes along our coasts and in other countries? The planting of beach grass to help hold down Cape Cod as compared with the methods used in France and other countries.

I find that the child does not have so much trouble in grasping the various classes of Coastal Plains if he makes diagrams, or models the surface and width of the plain according to the length of time that the forces have been at work. Let each diagram show the changes. Then the effect on vegetation, occupation, and travel, all depending on these conditions. In making a cross-section of a cuesta it enables the child to see how the difference in conditions affects the vegetation, occupations, and location of cities.

Take the most prominent physical features of Europe or America as contrasted with those of Africa, showing the effect on the progress of the nation. For example, the coast-line, surface, trend of the mountain ranges, age of streams which have aided or retarded the progress of the country.

Physical Geography is *not* a dull subject if the child realizes that he is not studying a text-book or a reference book, but conditions which affect his life and the lives of others. Sometimes for a review I assign to one part of the class a stone house, to another section a *brick* house, with lumber, furniture, food and clothing traced to the sources of the raw material, then to the manufacturing center, and finally to the receiving and distributing point. The reasons must be given for these sections producing these products whenever it bears on previous work.

Nothing aids your work more than field or laboratory work. Some simple experiments, as the formation of dew, evaporation and condensation, the making of a barometer, magnetism, or the formation of a geyser, are easily accomplished. Then the making of contour and hachure maps, the making and constant reading of weather maps, diagrams, specimens shown, and the use of lantern slides can not fail to make the work interesting and profitable.

In conclusion I wish to add that children can be trained so easily to read from a geographical standpoint; to learn to pick out conditions and to bring to the class clippings from magazines, newspapers, or other sources, material bearing on the work. This has been thoroughly tested, as a great many of the best clippings to which I have referred have been contributed by the pupils.

EDITORIAL

TEACHERS' GEOGRAPHY CLUBS

IN several of the larger cities of the country, teachers especially interested in geography have banded together in clubs for the purpose of discussing the materials available for school geography and for mutual assistance in improving geography teaching in schools. Such clubs have usually been extremely successful in many ways. Teachers have been brought in touch with new movements and new materials in geography, public interest has been aroused, the individual members have profited from the discussion of geography and geography teaching, and the co-operation of geographers has been secured in a way that could not be done except for the formal organization.

There is a great possibility in this field of work as has been shown by success in other lines. Teachers of science have long been banded in many of the states, and recently these associations have been affiliated in a federation of national scope. Within the last year the teachers of nature-study have formed the American Nature-Study Society for the purpose of improving nature-study teaching in schools.

Why should not teachers of geography in elementary schools combine, not perhaps in a national organization where a few individuals do all the work, but in a large number of local societies where each member may personally share in the work and profit of the association?

The JOURNAL has several times advocated such local organizations, and will be glad to help in any way possible in promoting this work. The Editor will be glad to suggest possible fields of work for such clubs, and to outline a plan of organization that may help in the starting of a simple but effective organization. He will be also glad to publish such results of any club's work as may seem of general interest to others engaged in similar work.

Geography teaching in schools can only be improved through co-operation and through a gradual approach toward uniform standards of work measured by comparison with geographic and educational ideals. The improvement has been so great in recent years that the time for organizations such as has been suggested is most appropriate. Let us all realize our responsibility and opportunity and put our shoulders to the wheel that we may progress together.

RECENT PUBLICATIONS

HOME LIFE IN ALL LANDS. By Charles Morris; pp. 309; Lippincott Company, 1907.

A supplementary reading book for elementary grades describing the manners and customs of peoples in all lands, with particular emphasis of "Queer Facts About Queer Folks." Full of facts described in an interesting way. In some cases the chapters are so crowded with individual items that it is hard to gain clear and adequate ideas from the text. Illustrated by numerous well chosen half tones and wood cuts.

GEOGRAPHICAL DIAGRAMS, with Questions, Statistics and Tables. By H. J. Sharpe; small quarto, pp. 56; London, Adam and Charles Black, 1907.

One hundred and twenty black and white maps and diagrams arranged largely in series. For instance, Africa is given seven maps as follows: Mean Annual Rainfall; Winter Rainfall; Summer Rainfall; Distribution of Minerals; Population; Vegetation; Natural Productions. Similar series are given for the other continents, and economic maps are included of several countries. Fourteen pages of statistics and six pages of questions complete the work.

Extremely suggestive and a valuable aid in courses for teachers.

THE WORLD ALMANAC AND ENCYCLOPEDIA FOR 1908. Pp. 800; New York, The Press Publishing Company, 1907.

The twenty-fifth anniversary number of the World's Almanac, like its predecessors, is an invaluable reference volume for teachers of geography and all others interested in geography. Statistics of all kinds, gathered from authoritative sources, are here easily available.

THE GEOLOGY OF NORTH CENTRAL WISCONSIN, being Bulletin XVI of the Wisconsin Geological and Natural History Survey. By Samuel Weidman; pp. 697; published by the State; Madison, Wisconsin, 1907.

An inclusive and detailed volume devoted to the Geology of North-Central Wisconsin. Part II, devoted to Physiographic Geology, and Part III, entitled Economic Geology, are especially valuable to teachers of geography wherever located. The numerous diagrams, maps and photographic reproductions add materially to the usefulness of the text.

ATLAS GEOGRAFICZNY. By Professor Romer; Warsaw, 1908.

A small physical atlas of the world, with political insets. A series of nine very excellent maps, showing ocean depths as well as land elevations.

THE PRACTICE OF INSTRUCTION. Edited by John W. Adamson; London, National Society's Depository, 1907.

Contains a sixty-page chapter on geography by Dr. A. J. Herbertson, Reader in Geography at Oxford University. Special attention given to Regional Geography and to an outline for the Elementary, Secondary and Public Schools of the British Isles. Includes a well selected bibliography of reference volumes.

LABORATORY EQUIPMENT FOR PHYSICAL GEOGRAPHY. Manufactured and sold by The Central Scientific Company, Chicago, Illinois.

One of the most complete catalogues that has come to hand. Should be known to all who have to equip laboratories for teaching physical geography.

XUM

NOTES

WEATHER FOLKLORE.[1]—It is safe to assume that our first parents acquired weather wisdom by observing weather sequences and noting the foreshadowed effects of certain atmospheric conditions on objects animate and inanimate. We may assume further that the knowledge thus acquired was communicated to their descendants, and that it was handed down, with additions and amplifications, from generation to generation. We find in the earliest writings and in the Scriptures expressions of weather wisdom, many of which appear in collections of the popular weather sayings of to-day. Thus by assumption and deduction we know that man has ever employed inherited and acquired weather wisdom in the daily affairs of life. When flocks and herds have constituted his earthly possessions he has been prompted to lead his charges to places of safety when signs of impending storms appeared. As a navigator his interpretation of the signs of the air has, in innumerable instances, enabled him to adopt measures calculated to avert disaster to his frail craft. As an husbandman he has closely scanned the sky, the air, and the earth for signs that would indicate the weather of the coming day and season.

The wisdom thus acquired has been perpetuated in the form of trite sayings or proverbs. Many of these sayings are polished gems of weather lore, others have lost their potency by transfer to foreign lands where dissimilar climatic conditions obtain, and a large proportion have been born of fancy and superstition.

The object of this paper is to segregate from the mass of available data the true sayings that are applicable to the United States, and to combine the material thus collected with reports on local weather signs that have been officially and specially prepared by observers of the United States Weather Bureau.

The laws that govern the distribution of the earth's atmosphere and control its phenomena necessarily produce different results on different parts of the earth's surface. The seasonal distribution of the atmosphere, as indicated by the greater, or so-called permanent, areas of high and low barometric pressure, is governed largely by the temperature of the land and water surfaces. In summer the pressure of the atmosphere is greater and its surface temperature is lower over the oceans than over the continents, and in winter the reverse of these conditions obtains. And the differences in atmospheric pressure and temperature control the seasonal

[1] Reprinted from Bulletin 33, U. S. Department of Agriculture, Weather Bureau.

directions of the winds. Similarly the smaller areas of high and low barometric pressure that appear on our daily weather maps produce the varying temperatures and winds, and, incidentally, the weather that we experience from day to day.

In the United States the centers of areas of high barometric pressure generally move in a south of east direction immediately preceded by winds that blow from points between west and north, low temperature for the season, and fair weather. Areas of low barometric pressure, or general storms, usually move in a north of east direction, and the winds in their east quadrants blow from easterly or southerly points of the compass, with high temperature for the season, and precipitation in the form of rain or snow.

It will be observed from the foregoing remarks that wind directions, as influenced by areas of high and low barometric pressure, produce high and low temperatures, fair and foul weather, and the fact will be recognized that all true popular weather sayings of ancient origin have been coined from the utterances, born of experience, of men who have observed, without understanding the causes thereof, the first indications of approaching weather changes.

References and sayings relating to wind, clouds, atmospheric pressure, temperature, and moisture, the habits and actions of animals and birds, and to plant life will in turn be briefly quoted and discussed, and reference will be made to sayings regarding times, days, and seasons, and the sun, moon, and stars. Many of the sayings quoted have been taken from Weather Proverbs, 1883, by Col. H. H. C. Dunwoody, U. S. Army, and Weather Lore, 1893, by Richard Inwards, F. R. A. S.

WIND

Every wind has its weather.—*Bacon.*

Weather proverbs that have been based upon observations of the wind conform to a notable degree with modern meteorological knowledge. In the temperate zone of the Northern Hemisphere easterly winds are proverbially rain winds and westerly winds are invariably associated with fair or clearing weather. The reason for this is apparent when the circulation of winds about areas of high barometric pressure, and areas of low barometric pressure, or general storms, is observed.

The Temple of the Winds at Athens indicates the knowledge possessed by the Greeks of the weather that is associated with winds from the various points of the compass. It is a little marble octagon tower, the eight sides of which are built to face the eight principal winds, and on each side is

sculptured a human figure, symbolizing the character and qualities of the particular wind it faces. The north wind, which is cold, is represented by the figure of a man warmly clad and blowing on a trumpet made out of a seashell. The northeast wind, which brought, and still brings, to the Athenians cold, snow and sleet, or hail, is figured by an old man with a severe countenance, who is rattling slingstones in a shield, expressing emblematically the noise and power of a hailstorm. The east wind, which brings to Athens rain favorable to the growth of vegetation, is expressed by the image of a young man with flowing hair and open countenance, having his looped-up mantle filled with fruit, honeycomb, and corn. The west wind is indicated by the figure of a slightly-clad and beautiful youth with his lap full of flowers. And so on with the winds from all around the compass, each has its qualities fixed in stone by its appropriate sculptured figure, and thus modern science learns from ancient poetry and art the fact that the climate of Greece has not materially changed, at any rate in respect to winds, after the lapse of about twenty centuries.

When the wind is in the north,
The skillful fisher goes not forth;
When the wind is in the east,
'Tis good for neither man nor beast;
When the wind is in the south,
It blows the flies in the fish's mouth;
When the wind is in the west,
There it is the very best.

Isaak Walton.

The terms employed in many proverbs to indicate wind directions are indefinite and confusing. The term north or northerly is often indiscriminately applied to winds blowing from the north quadrants, or from a range of 180° of the compass. As a matter of fact, a variation of the wind of a few points in the compass frequently changes absolutely the character of the weather that it indicates. In the case of north or northerly winds, directions from a few points east of north indicate rain or snow and ofttimes the severest storms to which a great part of the United States is subject. On the other hand, winds from points west of north generally indicate fair or clearing weather. East or easterly winds blow from the eastern quadrants, or from the 180° of the compass between north and south by way of east. From 90° of this semicircle, or from points between east and north, the winds often indicate, as before stated, our most violent storms of wind and snow or rain, while, following winds from the southeast quadrant, the character of the storms is less severe. South or southerly winds are, in many cases, considered as winds that blow from any part of

the southern quadrants. These quadrants also cover one-half of the points of the compass, and their winds indicate weather of a very different character. Winds from the southeast quadrant are rain winds, and those from the southwest quadrant are fair-weather winds. Westerly winds, both from the northwest and the southwest quadrants, are, essentially, fair weather winds, the principal distinction between these winds being that the southwest winds are warm and the northwest winds are cold.

A veering wind, fair weather;
A backing wind, foul weather.
If the wind back against the sun,
Trust it not, for back it will run.

Whether the wind backs or veers depends upon the position of the observer with reference to the approaching or passing storm. If a storm center approaching from a westerly direction passes south of the observer, the wind will back from easterly to westerly by way of north; if the storm center passes north of the observer, the wind will veer from easterly to westerly directions by way of south. When the wind is from a southerly direction and veers to westerly, fair weather will follow; when, on the contrary, it backs from southerly to easterly points, foul weather is likely to follow. The sayings regarding veering and backing winds hold good, therefore, only when the winds veer or back from southerly directions.

In Texas and the Southwest when the wind shifts, with strength, during a drought, expect rain.

In the West and Southwest when brisk winds from the south continue for a day or more, expect a "norther."

Over a great part of the United States a steady and strong south-to-east wind will bring rain within thirty-six hours.

Easterly winds are proverbially bringers of rain, and when they blow from the northeast quadrant in winter heavy snow is likely to be followed by severe cold.

When, during a storm, the wind shifts from the east to the west quadrants, clearing weather will soon follow.

When the wind is from points between west and north and the temperature falls to 40° or below, frost will probably occur.

The strength of the wind and the severity of storms depends upon barometric conditions.

Westerly winds (southwest to northwest) are fair-weather winds.

WEST INDIAN HURRICANES.

During the late summer and early fall months hurricanes occasionally develop in the tropical regions of the Atlantic, near the southern edge of the northeast trade winds, and move westward over or near the West Indies into the Gulf of Mexico or to the southern coasts of the United States.

Some of these storms recurve northwestward and then northeastward near the Atlantic coast of the United States, and others recurve northward over the Gulf of Mexico. West Indian hurricanes are the most violent and destructive storms that visit the eastern part of the United States. Happily, their visits to our coasts are not frequent; and their visitations to any individual island of the Windward West Indian group, which lies in the most frequented path of hurricanes, are on an average limited to about one in fifteen to twenty years.

As the tropical storms of the Atlantic move from east to west, the winds that indicate their approach necessarily differ from those that are noted in advance of continental storms of the middle latitudes that move from west to east. In the tropical and subtropical regions of the Atlantic Ocean and the Gulf of Mexico the approach of a hurricane from the eastward is indicated by north to northwest winds, which increase in force as the vortex of the storm approaches. The shift of the winds depends upon whether the center of the storm passes south or north of the observer. If it passes to the southward, the wind goes from northerly to easterly and southerly; if it passes to the northward, the wind goes from northerly to southerly by way of west.

West Indian hurricanes are preceded one to two days by barometer rising slowly above the normal and an unusually clear, cool atmosphere. These conditions are followed by a fall in the barometer and, generally, by a greasy-looking halo around the sun or moon, and by high cirrus or cirro-stratus clouds that are projected in advance of the vortex of the storm. Tufted or rolled clouds with lurid streaks of light and unusual atmospheric colors are in turn followed by rapidly falling barometer and a heavy bank of clouds in the horizon in and from which lightning flashes appear. This is the cloud mass that surrounds the center of the hurricane, which advances westward, in the tropical and subtropical regions, with a velocity of 15 to 20 miles an hour. Closely following the appearance of the cloud mass that surrounds the vortex of the storm, the barometer falls with great rapidity and the wind increases to hurricane force from the north quadrants, the direction within the range of these quadrants being governed by the position of the observer with reference to the path of the storm. The vortex of a hurricane is comparatively small, averaging probably 8 to 10 miles in diameter. In the central area of the vortex the sky overhead is often clear, and light confused winds are experienced. As a rule, places in the direct path of the vortex will experience this period of calm for a period of about one-half hour, when the hurricane winds will again set in from a quarter opposite to that from which they were pre-

viously blowing. The barometer then rises rapidly, the winds diminish, and the weather gradually clears. The great whirlwind has passed on its westward course. At the point where, from natural causes that differ in different cases, the hurricane makes its recurve to the northward, its speed lessens to 8 or 10 miles an hour, and its strength often increases. After the recurve to the northeastward has been made and the storm enters the middle latitudes of the ocean or of the United States, its area increases and its intensity generally diminishes.

The West Indian hurricane season is confined practically to the months of August, September, and October. Storms of this class sometimes occur, however, as early as June and as late as November.

The following lines regarding the tropical hurricanes of the Atlantic cover, in the opinion of mariners, the season of their probable occurrence:

June, too soon;
July, stand by;
August, look out you must;
September, remember;
October, all over.

—*Captain Nares.*

The tropical storms of the Pacific Ocean that originate near or to the eastward of the Philippine Islands and move thence westward over the China Sea, or northward near the China and Japan coasts, are called typhoons. These storms present the characteristics noted in connection with West Indian hurricanes. Their season is, however, longer, extending from July to November, with August and September as the months of greatest typhoon frequency. The Indian Ocean and the Bay of Bengal also have storms that conform in character to West Indian hurricanes. Cyclones is the very proper name that is applied to these storms. Their season appears to be somewhat longer than that of the typhoons, and the season of the Bay of Bengal cyclones is assumed as extending from May to November, with occasional storms in April and December.

In addition to the gyrating wind storms enumerated, the greater continental areas, and more especially their coast districts, are subject to strong seasonal winds that result from marked atmospheric pressure and temperature gradients that exist between their coastal and interior regions. The most pronounced winds of this type are the monsoons of southern and southeastern Asia and adjacent waters. The monsoons of southern Asia are due, during the warmer months, to the summer area of low barometric pressure that covers the warm interior of eastern Asia, whereby strong wind currents—the summer monsoons—are drawn from the southern

coasts and oceans; and during the colder months, when the interior of Asia is occupied by an area of high barometric pressure of great magnitude, the direction of the monsoon winds is reversed and they blow from the interior over the coasts. The change in the winds or, as it is termed, "the bursting of the monsoon," occurs in May and October, and the winds of these months are often very severe.

During the summer months the greater desert areas are the breeding places of violent whirling storms that are generated by the intense heat of those regions; and the deserts, and the regions that border them, are also swept by strong straight winds that are promoted by sharp gradients in temperature that exist between the desert surfaces and the cooler districts that surround them.

Thus it appears that in various parts of the world, winds, by whatever name they may be known, and in the various forms in which they are experienced, owe their origin primarily to differences in temperature in the atmosphere that overlies the land and water surfaces.

As wind directions and velocities are immediately associated with the distribution of atmospheric pressure, as indicated on weather maps by areas of high and low barometer, the value of systematic observations of the winds in foreseeing weather changes will be discussed under the head "Barometer."

CLOUDS.

Clouds are the storm signals of the sky.

Cloud formation is the beginning of the rain or snow producing process. When the process by which the aqueous vapor of the atmosphere is precipitated or condensed is feeble, clouds only are produced; when the process is stronger, or becomes more active at the cloud levels, rain or snow results.

In the United States, and more especially in the middle and northern districts, true cirrus or cirro-stratus clouds are almost invariably observed moving from points between southwest and northwest. The appearance of clouds of this type indicates the presence, or at least the partial development, of a barometric depression to the westward. They are formed by the condensation, in high altitudes and at low temperatures, of the moisture in the air that overflows and is projected eastward from areas of low barometric pressure. When the depressions possess sufficient strength, rain or snow follows the appearance of the clouds within eighteen to thirty-six hours. In such cases the cirrus clouds appear to thicken and merge into cirro-

stratus, then into alto-stratus, and finally into stratus and nimbus, when precipitation begins. The lower clouds possess but little value as rain indicators for the reason that they usually come with the rain or precede by very short periods the beginning of precipitation.

Mackerel scales and mare's tails
Make lofty ships carry low sails.
Mackerel clouds in sky,
Expect more wet than dry.
A mackerel sky,
Not twenty-four hours dry.

When cirrus merge into cirro-stratus, and when cumulus increase toward evening and become lower, expect wet weather.

After fine, clear weather the first signs in the sky of a coming change are usually light streaks, curls, wisps, or mottled patches of white distant clouds, which increase and are followed by an overcasting of murky vapor that grows into cloudiness. Usually the higher and more distant such clouds seem to be, the more gradual but general the coming change of weather will prove.—*Fitzroy.*

When cirro-cumulus clouds appear in winter, expect warm and wet weather. When threads of cirrus clouds are brushed back from a westerly direction, expect rain and wind.

If cirrus clouds dissolve and appear to vanish, it is an indication of fine weather.

The mackerel clouds always indicate storm if they first appear about 15° north of west. (Kansas.)

The longer the dry weather has lasted, the less is rain likely to follow the cloudiness of cirrus.

If cirrus clouds form in fine weather with a falling barometer, it is almost sure to rain.—*Howard.*

Cirrus clouds announce the east wind. If their streaks point upward, they indicate rain; if downward, wind and dry weather.—*Howard.*

When cloud streamers point upward, the clouds are falling, or descending, and rain is indicated; when cloud streamers point downward, the clouds are ascending, and dry weather is indicated.

Enough blue sky in the northwest to make a Scotchman a jacket is a sign of approaching clear weather.

When on clear days isolated clouds drive over the zenith from the rain-wind side, rain or snow will follow within twenty-four hours—more likely within a few hours.

Clouds flying against the wind indicate rain.

It will not rain much as long as the sky is clear before the wind; but when clouds fall in against the wind, rain will soon follow.

Evening red and morning gray
Will set the traveler on his way;
But evening gray and morning red
Will bring down rain upon his head.

XUM

When it is evening, ye say it will be fair weather, for the sky is red; and in the morning it will be foul weather to-day, for the sky is red and lowering.—*Matthew xvi, 2, 3.*

When a heavy cloud comes up in the southwest, and seems to settle back again, look out for a storm.

When ye see a cloud rise out of the west, straightway ye say: There cometh a shower; and so it is.—*Luke xii, 54*

If clouds at the same height drive up with the wind, and gradually become thinner and descend, expect fine weather.

If the upper current of clouds come from the northwest in the morning, a fine day will ensue.

A sky covered with clouds need not cause apprehension, if the latter are high and of no great density, and the air is still, the barometer at the same time being high. Rain falling under such circumstances is generally light, or of not long continuance.—*Jenyns.*

It never clouds up in a June night for a rain.

If two strata of clouds appear in hot weather to move in different directions, they indicate thunder.

If clouds float at different heights and rates, but generally in opposite directions, expect heavy rains.

A horizontal streak or band of clouds immediately in front of the mountains on the east side of Salt Lake Valley is an indication of rain within one or two days. When black clouds cover the western horizon, rain will follow soon, and extend to the eastward over the valley.—*Observer at Salt Lake.*

General squalls are preceded, accompanied, or followed by clouds; but the dangerous white squall of the West Indies is indicated only by a rushing sound and by white wave crests to windward.—*Fitzroy.*

A small, fast-growing black cloud in violent motion, seen in the Tropics, is called the "bull's eye," and precedes the most terrible hurricanes.

When you observe greenish-tinted masses of composite cloud collect in the southeast and remain there for several hours, expect a succession of heavy rains and gales.

When the clouds rise in terraces of white, soon will the country of the corn priests be pierced with the arrows of rain. (Zuñi Indians.)

When the cumulus clouds are smaller at sunset than they were at noon, expect fair weather.

When cumulus clouds become heaped up to leeward during a strong wind at sunset, thunder may be expected during the night.

Well-defined cumulus clouds forming a few hours after sunrise, increasing toward the middle of the day, and decreasing toward evening are indicative of settled weather; if instead of subsiding in the evening and leaving the sky clear they keep increasing, they are indicative of wet.—*Jenyns.*

Clouds upon hills, if rising, do not bring rain; if falling, rain follows.

When Lookout Mountain (Tennessee) has its cap on, it will rain in six hours.

BAROMETER.

At the level of the sea the weight of the atmosphere is about 15 pounds to every square inch, or about 1 ton to every square foot of the earth's surface. The barometer is used to gauge the weight or pressure of the atmosphere. This pressure is constantly varying, and the variations are instantly and accurately indicated by standard mercurial barometers. The indications thus furnished by the barometer are the best guides we now have for determining future weather conditions. As low barometer readings generally attend stormy weather, and high barometer readings are usually associated with clearing or fair weather, it follows that, as a rule, falling barometer indicates precipitation and wind, and rising barometer fair weather or the approach of fair weather. Upon the rapidity of the barometric changes depends the character of the weather that follows. As atmospheric waves and depressions are, by natural laws, caused to assume circular or oval forms, the wind directions with reference to barometric depressions, or areas of low barometer, are spirally inward toward the region of lowest atmospheric pressure, as indicated by readings of the barometer. The areas of low barometric pressure are, in fact, whirlwinds of greater or less magnitude and intensity, depending upon the steepness of the barometric gradient. The crests of the atmospheric waves, on the contrary, show winds flowing spirally outward from the region of highest barometric pressure.

The wind directions thus produced give rise to, and are responsible for, all local weather signs. The south winds bring warmth, the north winds cold, the east winds, in the middle latitudes, indicate the approach from the westward of a low barometer, or storm area, and the west winds show that the storm area has passed to the eastward. The indications of the barometer generally forerun the shifts of the wind. This much is shown by local observations.

In modern meteorological work, as conducted by the United States Weather Bureau, observations, simultaneously taken, are collected by telegraph from great areas, and it is possible by this means to calculate for periods of one to three days in advance the local signs that will be produced by the general conditions that are presented. In other words, modern meteorological appliances, methods, and skill make possible forecasts of the conditions that produce the local signs upon which all weather proverbs are based. Furthermore, it is now practicable not only to forecast general weather changes, but also to calculate with great accuracy the intensity and duration of storms.

XUM

The barometer and wind indications for the United States are generally summarized in the following table:

Barometer reduced to sea level.	Wind direction.	Character of weather indicated.
30.10 to 30.20 and steady.....	SW. to NW.	Fair with slight temperature changes for 1 to 2 days.
30.10 to 30.20 and rising rapidly.	SW. to NW.	Fair followed within 2 days by warmer and rain.
30.10 to 30.20 and falling slowly.	SW. to NW.	Warmer with rain in 24 to 36 hours.
30.10 to 30.20 and falling rapidly	SW. to NW.	Warmer with rain in 18 to 24 hours.
30.20 and above and stationary..	SW. to NW.	Continued fair with no decided temperature change.
30.20 and above and falling slowly	SW. to NW.	Slowly rising temperature and fair for 2 days.
30.10 to 30.20 and falling slowly.	S. to SE...	Rain within 24 hours.
30.10 to 30.20 and falling rapidly	S. to SE...	Wind increasing in force with rain within 12 to 24 hours.
30.10 to 30.20 and falling slowly.	SE. to NE.	Rain in 12 to 18 hours.
30.10 to 30.20 and falling rapidly	SE. to NE.	Increasing wind with rain within 12 hours.
30.10 and above and falling slowly	E. to NE...	In summer, with light winds, rain may not fall for several days. In winter rain within 24 hours.
30.10 and above and falling rapidly	E. to NE...	In summer rain probable within 12 to 24 hours. In winter rain or snow, with increasing winds, will often set in, when the barometer begins to fall and the wind sets in from the NE.
30 or below and falling slowly...	SE. to NE.	Rain will continue 1 to 2 days.
30 or below and falling rapidly..	SE. to NE.	Rain with high wind, followed within 24 hours by clearing and cooler.
30 or below and rising slowly...	S. to SW...	Clearing within a few hours, and continued fair for several days.
29.80 or below and falling rapidly	S. to E....	Severe storm of wind and rain or snow imminent, followed within 24 hours by clearing and colder.
29.80 or below and falling rapidly	E. to N....	Severe northeast gales and heavy rain or snow, followed in winter by a cold wave.
29.80 or below and rising rapidly	Going to W.	Clearing and colder.

Northerly and southerly winds may be classed with either fair or storm winds. When they blow from points west of north and south they are fair-weather winds; when from points east of north and south they are foul-weather winds.

During the colder months, when the land temperatures are below the water temperatures of the oceans and the Gulf of Mexico, precipitation will begin when the wind shifts and blows steadily from the water over the land without regard to the height of the barometer. In such cases the moisture in the warm ocean winds is condensed by the cold of the continental area. During the summer months, on the contrary, the on-shore winds are not necessarily rain winds, for the reason that they are cooler than the land surfaces and their capacity for moisture is increased by the warmth that is communicated to them by the land surface. In such cases thunderstorms commonly occur when the ocean winds are intercepted by mountain ranges or peaks. If, however, the easterly winds increase in force, with falling barometer, the approach of an area of low barometric pressure from the westward is indicated and rain will follow within a day or two.

Rapid changes in the barometer indicate early and marked changes in the weather.

A sudden rise in the barometer is very nearly as dangerous as a sudden fall, because it shows that the level is unsteady. In an ordinary gale the wind often blows hardest when the barometer is just beginning to rise, directly after having been very low.

Should the barometer continue low when the sky becomes clear, expect more rain within twenty-four hours.—*C. L. Prince.*

If the barometer fall gradually for several days during the continuance of fine weather, much wet will probably ensue in the end. In like manner, if it keep rising while the wet continues, the weather, after a day or two, is likely to set in fair for some time.—*Jenyns.*

A very low barometer is usually attendant upon stormy weather, with wind and rain at intervals, but the latter not necessarily in any great quantity. If the weather, notwithstanding a very low barometer, is fine and calm, it is not to be depended upon; a change may come on very suddenly.—*Jenyns.*

If the barometer and thermometer both rise together,
It is a very sure sign of coming fine weather.

If the barometer falls two or three-tenths of an inch in four hours, expect a gale of wind.—*C. L. Prince.*

If you observe that the surface of the mercury in the barometer vibrates upon the approach of a storm, you may expect the gale to be severe.—*C. L. Prince.*

In summer, when the barometer falls suddenly, expect a thunderstorm; and if it does not rise again when the storm ceases, there will be several days of unsettled weather.—*C. L. Prince.*

A summer thunderstorm which does not much depress the barometer will be very local and of slight consequence.—*C. L. Prince.*

When the barometer falls considerably without any particular change of weather, you may be certain that a violent storm is raging at a distance.—*C. L. Prince.*

In winter heavy rain is indicated by a decrease of pressure and an increase in temperature.—*C. L. Prince.*

The barometer falls lower for high winds than for heavy rain.

When the glass falls low,
Prepare for a blow;
When it rises high,
Let all your kites fly.
—*Nautical.*

First rise after low,
Fortells stronger blow:
Long foretold (falling), long last;
Short notice, soon past.
—*Fitzroy.*

From the Mississippi and Missouri valleys to the Atlantic coast, and on the Pacific coast, rain generally begins on a falling barometer, while

in the Rocky Mountain and plateau districts, and on the eastern Rocky Mountain slope, precipitation seldom begins until the barometer begins to rise, after a fall. This is true as regards the eastern half of the country, however, only during the colder months, and in the presence of general storms that may occur at other seasons. In the warmer months summer showers and thunderstorms usually come about the time the barometer turns from falling to rising. The fact that during practically the entire year precipitation on the great western plains and in the mountain regions that lie between the plains and the Pacific coast districts does not begin until the center of the low barometer area has passed to the eastward or southward and the wind has shifted to the northern quadrants, with rising barometer, is an important one to the forecaster.

Climate of Egypt.—Egypt may be divided climatologically into the following four regions:

1. The North Coast and the Delta.
2. Middle Egypt down to latitude 27° N.
3. Upper Egypt and the Northern Sudan as far south as latitude 18° N.
4. The rest of the Sudan to latitude 5° N. The Red Sea littoral and the country south of latitude 10° form two divisions.

The first region depends for its climate on proximity to the Mediterranean, and is much affected by the storms of that sea. The prevailing wind is the northeast trade, which here blows rather from the northwest. Storms passing to the north bring south winds, followed by comparatively abundant rain in winter and spring.

The second region forms a transition belt between the first and third. It is near enough to the Mediterranean to feel the influence of the prevailing weather there, but is chiefly influenced by the presence of the desert on both sides.

The third region is beyond the influence of the Mediterranean weather, and is entirely controlled by its proximity to the desert. The northeast trade blows uniformly all the year, and south winds are almost unknown. Rain is limited to occasional falls in thunderstorms.

The fourth region is affected in summer by the monsoon of northeast Africa, but for the rest of the year lies in the belt of the northeast trades. It thus suffers a regular seasonal alteration of weather, dry northerly winds prevailing for rather more than half the year, while moist southerly winds, accompanied by copious rain, blow for the remaining portion.—*Bulletin of American Geographical Society*, November, 1907.

THE EXPORTS OF THE UNITED STATES.—A study of the recently received Annual Summary of the Foreign Commerce of the United States of the Department of Labor and Commerce presents some interesting facts as to the growth of our foreign commerce. The value of the cotton exported in the year ending June 30, 1907, is more than twice as great as that of meat and dairy products, the second most valuable group. In round millions of dollars the leading exports are as follows:

Cotton	481 millions
Meat and dairy products	202 millions
Bread stuffs	184 millions
Iron and steel	181 millions

The greatest import is sugar, 92 millions of dollars, followed closely by hides and skins, and chemicals.

Our greatest trade is with the United Kingdom, being more than twice as great as that with Germany, the second nation in importance of trade with us. New York, Galveston, Boston and New Orleans are our principal ports in the order mentioned. New York City alone has practically 44% of the total foreign trade of the country, and the four cities mentioned share 66% of that trade.

THE WANING HARDWOOD SUPPLY.—Although the demand for hardwood lumber is greater than ever before, the annual cut to-day is a billion feet less than it was seven years ago. In this time the wholesale price of the different classes of hardwood lumber advanced from 25 to 65 per cent. The cut of oak, which in 1899 was more than half the total cut of hardwoods, has fallen off 36 per cent. Yellow poplar, which was formerly second in point of output, has fallen off 38 per cent., and elm has fallen off one-half.

The cut of softwoods is over four times that of hardwoods, yet it is doubtful if a shortage in the former would cause dismay in so many industries. The cooperage, furniture, and vehicle industries depend upon hardwood timber, and the railroads, telephone and telegraph companies, agricultural implement manufacturers, and builders use it extensively.

This leads to the question, Where is the future supply of hardwoods to be found? The cut in Ohio, and Indiana, which, seven years ago, led all other states, has fallen off one-half. Illinois, Iowa, Kentucky, Michigan, Minnesota, Missouri, New Jersey, Tennessee, Texas, West Virginia, and Wisconsin have also declined in hardwood production. The chief centers of production now lie in the Lake States, the lower Mississippi Valley, and the Appalachian Mountains. Yet in the Lake States the

presence of hardwoods is an almost certain indication of rich agricultural land, and when the hardwoods are cut the land is turned permanently to agricultural use. In Arkansas, Louisiana, and Mississippi the production of hardwoods is clearly at its extreme height, and in Missouri and Texas it has already begun to decline.

The answer to the question, therefore, would seem to lie in the Appalachian Mountains. They contain the largest body of hardwood timber left in the United States. On them grow the greatest variety of tree species anywhere to be found. Protected from fire and reckless cutting, they produce the best kinds of timber, since their soil and climate combine to make heavy stands and rapid growth. Yet much of the Appalachian forest has been so damaged in the past that it will be years before it will again reach a high state of productiveness. Twenty billion feet of hardwoods would be a conservative estimate of the annual productive capacity of the 75,000,000 acres of forest lands in the Appalachians if they were rightly managed. Until they are we can expect a shortage in hardwood timber.

Circular 116, of the Forest Service, entitled "The Waning Hardwood Supply," discusses this situation. It may be had upon application to the Forester, Forest Service, Washington, D. C.

THE ASSOCIATION OF AMERICAN GEOGRAPHERS.—The fourth annual meeting of the Association of American Geographers was held in Chicago during Convocation week. The sessions lasted three days, December 30, '07 to January 1, '08. Twenty members were present and forty-four papers were presented, the largest number offered at any meeting thus far.

A source of much interest was the Round Table Conference led by Professor Davis on the subject of Uniformity of Method in Geographic Investigation and Instruction. The results of the animated discussion were unfortunately not embodied in a resolution, but the discussion will doubtless lead to some definite expression in the near future. The question of greatest interest was whether the surface of a given area can be adequately described in the technical terms of systematic geography, without the use of empirical descriptions.

Officers elected for the coming year are G. K. Gilbert, president; R. D. Salisbury, first vice-president; Ellen C. Semple, second vice-president; A. P. Brigham, secretary; N. M. Fenneman, treasurer; R. S. Tarr, member of council for three years.

It is expected that the next annual meeting will be held at New Haven under the auspices of Yale University.